Patent Claims

1. Field device for determining and/or monitoring at least one process variable of a medium in a container, comprising:
at least one mechanically oscillatable unit (1),
wherein the mechanically oscillatable unit (1) is connected with the container via a process connection (2); and
at least one driver/receiver unit (5),
wherein the driver/receiver unit (5) excites the mechanically oscillatable unit (1) to oscillate, or wherein the driver/receiver unit (5) detects the oscillations of the mechanically oscillatable unit (1), as the case may be;
characterized in that -
the mechanically oscillatable unit (1) has at least three oscillatory members (10, 11, 12);
at least one oscillatory member (10) is connected, at an attachment region (10.3), with the process connection (2);
the three oscillatory members (10, 11, 12) execute oscillations, which the driver/receiver unit (5) produces, or detects, as the case may be; and
the three oscillatory members (10, 11, 12) are embodied and interconnected in such a manner, and the attachment region (10.3) is selected in such a manner, that an approximately defined transmission of reaction forces and reaction torques occurs between the mechanically oscillatable unit (1) and the process connection (2).

2. Field device as claimed in claim 1,
characterized in that
the oscillations of the mechanically oscillatable unit (1) are bending oscillations.

3. Field device as claimed in claim 1 or 2,
characterized in that

at least the embodiment of the three oscillatory members (10, 11, 12), their interconnections, and the attachment region (10.3) and their matching to one another are determinable and/or calculable in such a manner that at least the net reaction forces and reaction torques acting on the process connection (2) because of the oscillations of the mechanically oscillatable unit (1) are as close to zero as possible.

4. Field device as claimed in claim 1, 2 or 3,
characterized in that:
the three oscillatory members (10, 11, 12) are a long rod (10) of length (L), mass (M) and stiffness (EI), a first short rod (11) of length (L1), mass (M1) and stiffness (EI1) and a second short rod (12) of length (L2), mass (M2) and stiffness (EI2);
the first short rod (11) is connected, with an end region (11.1) turned toward the process, to the long rod (10), at at an end region (10.1) of the long rod (10) turned toward the process;
the second short rod (12) is connected, with an end region (12.2) turned away from the process, to the long rod (10), at at an end region (10.2) of the long rod (10) turned away from the process; and
the long rod (10) is connected with the process connection (2) at least at an attachment region (10.3).

5. Field device as claimed in claim 4,
characterized in that
the two short rods (11, 12) have essentially equal length, essentially equal mass, or essentially equal mass moment of inertia about their center of rotation, as the case may be, and essentially equal stiffness.

6. Field device as claimed in claim 4 or 5,
characterized in that
the first (11) and/or the second short rod (12) have/has at least one groove/neck (15), which determines at least the oscillation frequency of the mechanically oscillatable unit (1).

7. Field device as claimed in claim 4,
characterized in that
the long rod (10) surrounds at least the first short rod (11) coaxially.

8. Field device as claimed in claim 4 or 7,
characterized in that
at least the second short rod (12) coaxially surrounds the long rod (10).

9. Field device as claimed in claim 4,
characterized in that
the long rod (10) coaxially surrounds both short rods (11, 12).

10. Field device as claimed in claim 4,
characterized in that
the process connection (2) is a tube, to which the long rod (10) is secured at least in the attachment region (10.3).

11. Field device as claimed in claim 4,
characterized in that
the driver/receiver unit (5) is located between the end region (10.1) of the long rod (10) turned toward the process and the end region (11.1) of the first short rod (11) turned toward the process.

12. Field device as claimed in claim 4,
characterized in that
the driver/receiver unit (5) is located between the end region (10.2) of the long rod (10) turned away from the process and the end region (12.2) of the second short rod (12) turned away from the process.

13. Field device as claimed in claim 1, 4, 11 or 12,
characterized in that
at least one piezoelectric element is provided in the driver/receiver unit (5).

14. Field device as claimed in claim 13,
characterized in that
the piezoelectric element in the driver/receiver unit (5) includes at least two segments, which are polarized in mutually opposite directions, wherein the polarization directions lie parallel to an axis (16) of rotation of the mechanically oscillatable unit (1).